
II. *Obſervations upon the Membranes encloſing the* Faſciculi *of Fibres, into which a Muſcle is divided. By Mr.* Leeuwenhoek, F. R. S. *Tranſlated by Dr.* Sprengell, *F. R. S.*

Delft, Jan. 9. 1720.

SOmetime ago I miſs'd a ſmall piece of Fleſh, which I had left ſtanding before a Microſcope, and endeavouring to procure ſuch another, I cut off ſeveral thin ſlices from a piece of Beef; in doing which, whenever I cut the fleſhy Fibres thro' tranſverſly, I could plainly diſcover the Membrane, as it is commonly call'd, which runs between and envelopes the fleſhy Fibres, and eſpecially the larger *Faſciculi* of them, as they run lengthwiſe along the Muſcle. Between theſe *Faſciculi* the Membrane is of a conſiderable thickneſs, but ſpreads out every way into Ramifications exceedingly ſmall. I had obſerv'd ſome Weeks before, that this Membrane was compoſed of an inconceivable number of very ſmall Veſſels, which were plainly to be diſcern'd not only where the Membrane appear'd of ſome conſiderable breadth, but even where it was not ſo broad as a ſingle Muſcular Fibre; but how far this held, I could not determine, foraſmuch as theſe ſmall Ramifications of the Membrane, did again ſpread themſelves into other Ramifications ſo exceedingly fine, eſpecially where they encloſed the ſingle Muſcular

Fibres,

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Fibres, that they were in a manner inviſible even through my beſt Microſcopes.

The very ſmall Veſſels, which compoſe this Membrane, (as it is call'd) are doubtleſs framed to convey ſome nutritious Juices, yet they are ſo ſmall, that the Globules of Blood cannot paſs through them.

That this might be the better underſtood, I cauſed a ſmall piece of the Membrane to be deſigned, as at Fig. 1. *A. B. C. D.* which, with the adjoining fleſhy Parts, is cut thro' tranſverſly, and ſince it was impoſſible for the Deſigner to draw the extraordinary number of Veſſels, which compoſed it, on account of their being ſo exceeding ſmall, he has repreſented them only by Points.

Altho' in my former Letters I gave ſome Draughts of the Carnous Fibres cut thro' croſs-way along with the Membranes, yet for the ſatisfaction of thoſe who have not ſeen my other Letters, I have given them here another Draught of the ſame. See Fig. 1. between *E. F. G.* and *H. I.*

Theſe carnous Fibres, when wet, lay ſo cloſe to each other, that the ſpace between *E. F. G.* and *H. I.* was quite fill'd up; but when dry'd, the Fibres were ſo ſhrunk, that one might ſee ſuch Spaces between them as are here delineated.

Now as we ſee, upon the drying of the Membranes *A. F. G.* and *D. E. G.* with the Muſcular Fibres between them, what a number of ſmall Ramifications proceed from the Membranes, as is here repreſented between the muſcular Fibres; we muſt not imagine, that theſe Ramifications proceed only from the points here repreſented, but that they are continued the whole length of the Fibres, and ſubdividing themſelves into ſtill finer Ramifications, they encloſe every ſingle Fibre in the whole Muſcle.

Amongſt ſeveral pieces of Fleſh, where the carnous Fibres were cut tranſverſly, I happen'd on one piece with its Branches ſo plain, that the Membranes and Fibres look'd like ſo many Boughs of Trees, with the Leaves on them, as may be ſeen at Fig. 2. *K. L. M. N.* where *M.* ſhews the ſo call'd Membrane torn off from another, as alſo how many Branches it runs into, and the many Fibres it covers.

All theſe carnous Fibres, with the ſo call'd Membranes, lay very compact together, when I cut them off from the piece of Fleſh, as likewiſe when I laid them on the Glaſs, and moiſtened them; but as the moiſture dry'd away, they ſhrunk again, in the manner here repreſented, and altho' the Deſigner could plainly diſtinguiſh the ſmall Veſſels which were cut thro', the largeſt of which appear'd at *M.* Fig. 2. yet he was obliged to mark them only with Points. Here you may obſerve, that all the carnous Fibres, having been cloſely tied together by the ſaid Membranes, by which they were enveloped, which are nothing but a congeries of Veſſels, could not be ſeparated from each other upon drying, but by tearing aſunder thoſe Membranes.

The carnous Fibres along with the ſo call'd Membrane, at Fig. 2. *K. L. M. N.* do not take up ſo much room, but that a grain of Sand may cover it, and yet one might very diſtinctly obſerve, in ſome of thoſe carnous Fibres, the parts of which they were compoſed.

This Obſervation I was reſolved to purſue in the Fleſh of a Whale, of which I had kept two pieces by me, for about 7 or 8 Years, of about a Span long, and two Inches thick; from theſe I cut ſeveral Slices tranſverſly, but found that the carnous Fibres ſo cut through did eaſily ſeparate from one another, ſo that I could not find my account in this, but thought that the Membranes were rotten. Therefore I did cut off the outſide with a Table-Knife, and then with a very ſharp Knife I cut the inner part into very fine Slices, and there I found the Excrements of Mites, which were very ſmall, but globular, and ſome of them as ſmall as I had ever ſeen before, and ſo going on, I found theſe Excrements every where, eſpecially where the Membranes were thickeſt; then looking into ſuch places where the Membranes were thinneſt, inſomuch that I was ſatisfied, that a Mite, tho' juſt come from the Egg, could hardly find room there, there it was that I diſcover'd in the ſo nam'd Membranes, the aforeſaid Veſſels, and that in as great a number as I had ſeen them in the Oxe's Fleſh, and as plain as one can ſee the holes in a Thimble with the naked Eye.

After the former Diſcoveries that I had made concerning the Circulation of the Blood, particularly that the Blood Veſſels had no Endings, I began to conſider how the Fat-Particles could be formed, ſince I did not think that they were ſeparated from the Blood, and came out of the Blood-Veſſels. But having now plainly diſcover'd, that the ſo call'd Membranes were nothing but very ſmall Veſſels, and believing that they were created for no other end but to tranſport Nutriment, as alſo that there was no Circulation in theſe Veſſels, I imagin'd that the Matter which we call Fat, was brought into them, which, when there was too great a ſupply of Nutriment, ſo that it could not be forced farther on, muſt be driven out of theſe Veſſels; for all the Particles of Fat, that I have as yet obſerv'd, are incloſed in ſmall Films.

This Original of the Fat is to me much more credible, than that it ſhould be forced out of the Blood Veſſels; and yet how theſe fatty Particles, which conſiſt of ſmall globules, and thoſe out of ſtill ſmaller globules (as it appears to me) are made and formed, I cannot as yet determine: As alſo where theſe Veſſels, which conſtitute what we call Membranes, have their beginning, and how this Fat is brought into them.

I had in my Drawer a piece of Oxe's-fleſh, that I believe had lain there about four Years, wrapp'd up in a Paper, which Piece I found in ſome places to be cover'd with a Membrane; from this I cut off ſeveral ſmall Slices along with the Membrane, and I found that near the Membrane, there lay about 16 or 18 Nervous Fibrils, which, in the drying of the Fleſh, were ſo ſqueez'd together, that they were almoſt twice as long as they were broad. In ſome of which I ſaw very diſtinctly thoſe Veſſels, which are in the Nerves.

Theſe Nervous *Fibrillæ* were encloſed by a ſort of half round, ſeparating them from the Muſcular Fibres, which half round conſiſted of a row of ſmall Tendinous *Fibrillæ*, each of which was about twice as thick as a Hair of a Man's Beard. Without theſe Tendinous *Fibrillæ* lay the Muſcular Fibres, that had been cut through tranſverſly, and in this part of the half round there were ſeveral Apertures, which ſeem'd in the Microſcope to be big enough for Hemp-ſeed to paſs through them, which might well be taken for Veſſels, but that there lay ſo many of them together. But conſidering that the Nerves are commonly cover'd with fatty Particles, I concluded that theſe Apertures were no Veſſels, but meer fatty Particles, which I found to be true when I had cut thro' them, and diſcover'd that the inward Fat was eaten out by the Mites, which had left only the Huſks, or *Cortices*, of the Fat Globules behind: Which *Cortices* I never had as yet been able to diſcover, becauſe the *Cortices* of the Fat Globules would, upon any heat, melt away as faſt as the inward Fat.

III. *Obſervations upon the Veſſels in ſeveral ſorts of Wood, and upon the Muſcular Fibres of different Animals. By the ſame Curious and Inquiſitive Perſon.*

Delft, Jan. 24. 1721.

SEEING ſome reddiſh Boards carry'd into a Houſe in my Neighbourhood, and enquiring what uſe they were deſign'd for, I was anſwer'd that they were bought of the *India* Company to make Cabinets of, and that they came from the Iſland *Amboina.*

I procured a piece of that Wood ſaw'd off at the end of a Board, as likewiſe ſome of the Chips, in order to obſerve the Veſſels therein; and, cutting the Wood through all manner of ways, I found that in one place the Wood appear'd whitiſh, that at a ſmall diſtance

Philoſoph: Tranſact: N°. 367

Pla: II.

Fig. 1.

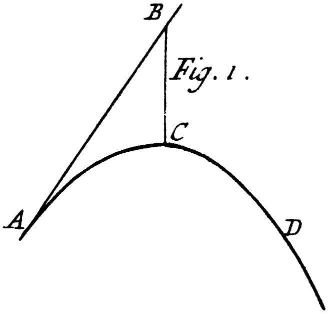


Fig. 2.

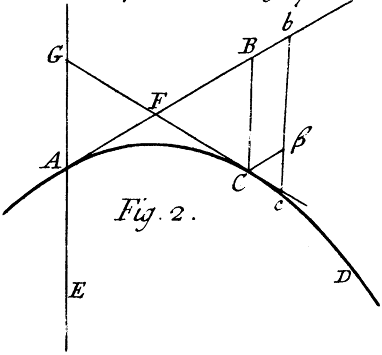


Fig. 4.

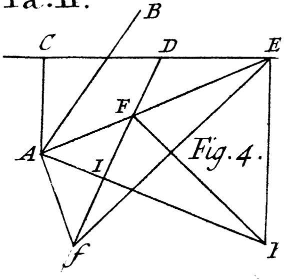
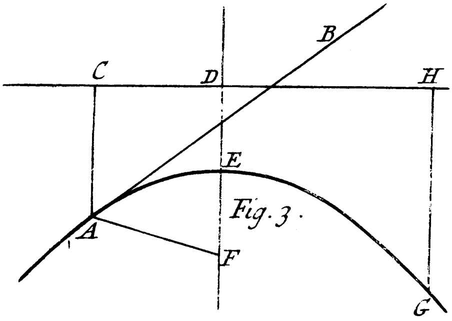


Fig. 3.



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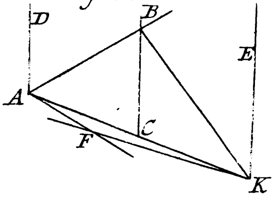

Fig. 7.

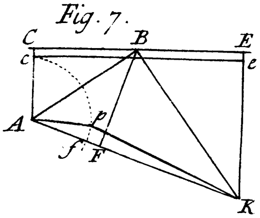

Fig. 8.

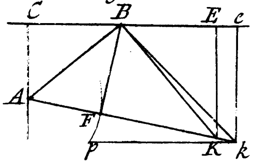

Fig. 9.

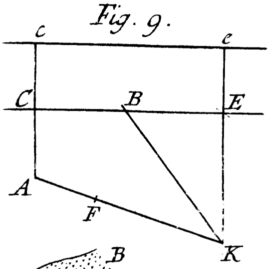

Fig. 5.

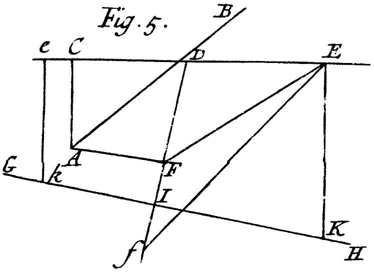

Fig. 1

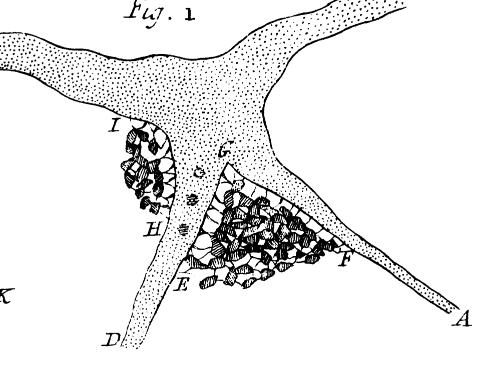

Fig. 2.